

Fort Leonard Wood Installation Design Guideline

Index

General Instructions

Executive Summary

Installation Improvements

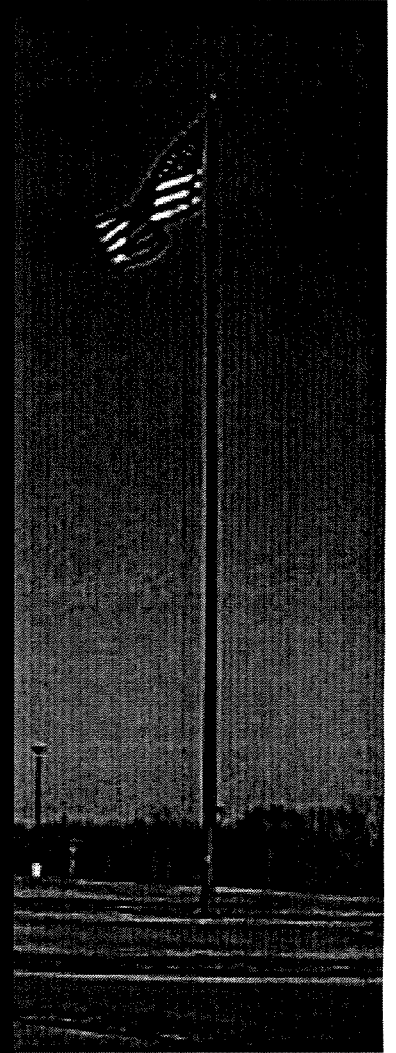
Mission Zone

Community Facilities Zone

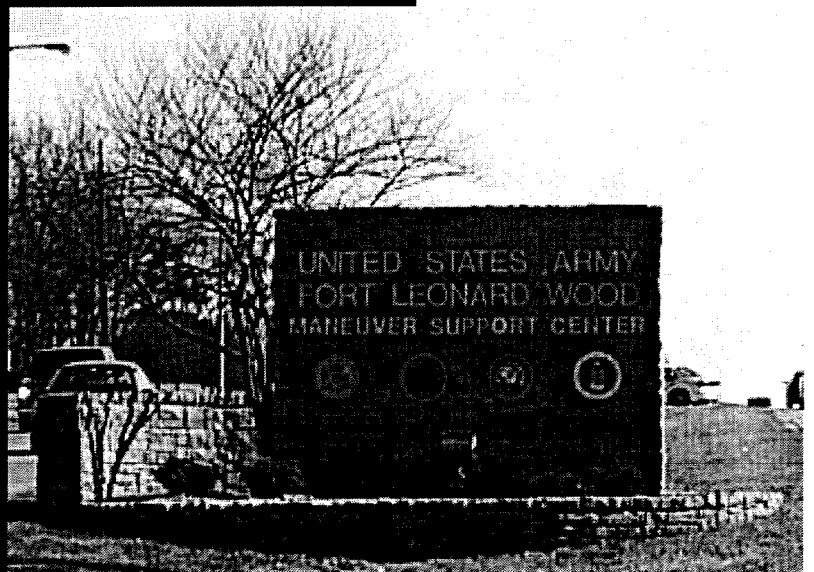
Housing Zone

Industrial Zone

Open Space Zone



60% SUBMITTAL



SECTION 4-HOUSING ZONE

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4.1 FACILITY DESCRIPTION

A large number of the buildings at Fort Leonard Wood serve as housing. Housing accommodations range from Specker Barracks to elegant single-family homes, which are reserved for senior officers. Generally speaking, Fort Leonard Wood has some of the most pleasant residential areas of any post in the country.

Existing facilities include family, unaccompanied enlisted personnel housing (UEPH), unaccompanied officers quarters (UOQ) and troop housing. Family housing areas offer single and multi-family facilities. All facilities are accessible from ground floor entries. There are no apartment buildings serving as family housing. Parking seems to be adequate, however the on-street head in parking bays in non-commissioned officer housing (NCO) areas, and Specker Barracks has a negative visual impact on the quality of life in these areas. UEPH areas are located in several areas of the post, and include mostly two and three-story walk-up buildings.

4.2 HISTORICAL IMPLICATIONS

Alterations made to the housing zone must be coordinated with the DEH Environmental Section, Fort Leonard Wood, to determine effects on prehistoric and historic Cultural Properties. Refer to the Installation Historic Preservation Plan to determine significance of Cultural Properties.

4.3 EXISTING AND INTENDED IMAGE

The majority of the family residential areas project a very positive visual image. The image is that of a suburban subdivision, set amidst rolling wooded hills. This image is particularly compatible with the army's goal of providing a high quality family life.

However, there are items that should be addressed to enhance the image of family housing areas.

- Clearly define street hierarchy in NCO junior officer areas.
- Incorporate adequate transition buffers between industrial-utility functions and housing areas.
- Develop well-defined neighborhood entrances to family housing areas.

Older UOQ areas, convey a less positive image. The unarticulated buildings appear to be of lower quality building construction than other housing units. It is recommended that a residential campus theme be developed for these UOQ areas. This theme should evoke permanence and identity within a framework of formal planning that provides connections to recreation areas and semi-detached parking facilities.

Specker Barracks provides a radical departure from the design of other residential areas. From a visual standpoint, the building construction is more in keeping with the mission areas of the post. However, it lacks the formal site organization and clarity displayed by the majority of mission buildings. Conflicts between vehicular and pedestrian circulation combined with a lack of visual screening and uninterrupted views of parking areas detract from the intended image of the housing zone.

4.4 GOALS AND OBJECTIVES

The existing image of a suburban subdivision contributes to a high quality of life for the family housing areas. The residential building forms of the NCO Academy project a residential campus image with well-defined neighborhood entrances and landscape buffer zones.

- Establish visually identifiable entry points to residential neighborhoods as well as individual units, through street hierarchy, landscaping, street furniture, lighting, built form articulation, and signage.
- Strengthen and preserve natural open space transition buffers between housing and industrial/utility functions.
- Coordinate building materials to create a visually compatible, but varied residential image.

4.5 VISUAL THEME

4.5.1 Overview

The goal of the Housing Zone is to create a series of neighborhoods with separate identities, as well as visual separation from the remainder of the post.

4.5.1.1 Liabilities

Presently, the assorted housing groups within this zone vary in the level of success they achieve. The principal liabilities are listed below.

- In general, there is an absence of a defined and visually identifiable entrance to the neighborhoods.
- Within several of the two story duplex units, individual entrances are not clearly define due to an off-centered walk that leads to a shared front porch.
- The siting of several NCO multi-family units, limits occupant privacy because of insufficient parking setbacks and shared entry porches.
- The siting of buildings along streets, especially with on-street parking bays, does not offer any opportunity for clustering of units. See 7000, 8000, and 9000 areas.
- Some family housing neighborhoods are overcrowded due to narrow streets and insufficient setbacks.
- Some neighborhoods need renovation because of outdated floor plans, insufficient sidewalks and storage space, poor drainage, and substandard utility systems.

4.5.1.2 Assets

The major assets of housing areas include:

- Suburban setting of family housing areas contributes to a high quality of life.
- Proximity of residential units to rolling wooded hillsides provides a natural buffer between residential units and adjacent land uses.

4.5.2.2 Size

In elevation, all building should be limited to 25 feet in height for family housing and 40 feet in height for UEPH areas.

4.5.2.3 Site Planning

4.5.2.3.1 Architectural Considerations

- Informal geometry is appropriate to the design of single and multi-family residential neighborhoods. The curvilinear street patterns found in the Leiber Heights area should be continued.
- Adapt buildings to particular site conditions.
- Establish small neighborhood groups in family housing areas, similar to buildings 4850 to 4854.
- In UEPH areas establish small neighborhood groups separate from the family housing by clustering individual structures around courtyards. See 4100 Buildings.
- Within troop housing areas, establish small groups by clustering individual structures around courtyards. Within Specker Barracks, establish structured outdoor courts for socialization.

4.5.2.3.2 Landscape Architectural Considerations

- Analyze the particular site for its functional properties, as well as for its visual assets and liabilities.
- Determine the particular site's visual boundaries by analyzing on and off-site views.
- Determine the optimum entry points for pedestrian and vehicular circulation.
- Document and natural site features such as topography, vegetation, slopes, and adjacent land uses.
- Locate buildings to take advantage of site attributes and preserve existing landforms

4.5.1.3 Objectives

New construction and renovation projects should implement the following objectives:

- Establish self-contained neighborhood groups with distinct boundaries and articulated entries.
- Provide residential site planning with clear hierarchy and an adequate distance for setbacks.
- Group multi-family units around courtyards, and clearly define individual entrances.
- Implement an appropriate color plan per post standards.
- Provide planned communities with modern efficient floor plans.
- Incorporate wider streets to relieve overcrowding in neighborhoods.
- Provide a sufficient number of playgrounds in close proximity to family housing areas and provide direct pedestrian circulation routes to these areas.
- Upgrade underground utility systems.
- Implement Family Housing Master Plan through the year 2013.

4.5.2 Architectural Considerations

These objectives may be achieved by observing the following design criteria during construction of new housing areas and renovation of older neighborhoods.

4.5.2.1 Form

In plan, all buildings shall be rectangular with square corners. Elements such as porches, bay windows, garages and storage sheds should be designed as an integral part of the housing unit.

A single pitched roof or a series of pitched roofs shall shape the elevation of all buildings. The repetition of this form within a particular cluster will provide unity while the variation of pitch, from 4:12 to 6:12 will provide variety. Also see TRADOC Roofing Policy HQTRADOC letter ATEN- FE 27 June 1987, Roofing Policy.

and vegetation by establishing clearing limit lines.

- Incorporate gradual transitions rather than abrupt changes in grade.
- Provide recreational courts in all housing areas and appropriate pedestrian connections to sidewalks.
- Layout and Setbacks
 - Observe a minimum 30' front yard setback from a main primary or secondary road such as Indiana, Oklahoma or Constitution Avenues. No structure shall be less than 25' from a dead-end "neighborhood" or tertiary road, or on-street parking bay.
 - Observe a 30' minimum side and rear yard setback between adjacent structures or secondary roads. At neighborhood entrances buildings should allow a minimum 60' setback from the connecting roadway.
- Allow space for future or likely expansion of buildings.

4.5.2.4 Service Areas

Dumpsters and storage sheds shall be screened from direct view of the street. The design of storage areas should be an integral part of the building design.

4.5.2.5 Materials

The elevations of all housing units shall be surfaced with brick and/or integral color metal siding. Metal siding should be formed to look like wood clapboard and be compatible with the existing siding. EIFS is an acceptable alternative when the use of brick and/or metal siding is not economically feasible.

All soffits and fascia must be covered with low maintenance materials, such as baked on painted aluminum or metal. Finish all corners with edge strips.

4.5.2.6 Color

4.5.2.6.1 Family Housing

Although the majority of colors of family housing units are appropriate, the use of dark brown and more than one primary color within a single elevation provides an unattractive visual image and does not comply with TM-807-7, Color for Buildings.

Within family housing areas siding should be tan (color numbers 23727, 13711, 16555, or 13531), gray (color number 26559 or 26622), or light blue (color number 15529). Integral color window frames, doors, and trim shall be semi-gloss white (color number 37778) or semi-gloss gray (color number 17875). Not more than one color should be used as the primary color for a building elevation. Composite shingle roofs, concrete paving and foundations shall be gray (color number 36622).

4.5.2.6.2 Non-Family Housing

Primary elevation colors for UOQ and UEPH areas shall be brown brick (color number 30109). If economically necessary integral color siding or EIFS may be used as an accent color in tan (color number 13531) or white (color number 37778). Integral color window frames, doors and trim shall be semi-gloss bronze (color number 10080). Composite shingle roofs, concrete paving and foundations shall be gray (color number 36622). Standing seam metal roofs shall be integral finish bronze (color number 10080).

4.5.2.7 Openings/Fenestration

Within the housing zone the fenestration or arrangement of windows and entrances should be expressed as a series of punched openings in a wall plan. Windows shall be clear glass with double-hung assemblies. Within UOQ and UEPH buildings glass may be either clear or bronze tinted obscure glass. Reflective glass of any type or color should not be used in the housing zone. The proportion of glazed area shall not be less than 5% of the total building elevation. See: HQ. TRADOC letter ATF.N-FF- 10 May, 1984, TRADOC Window Policy.

4.5.2.8 Scale

The massing of a building refers to the overall bulk or volume that a building encloses. Within the housing

zone building elements such as rooflines, heights and fenestration should relate to a human scale. Cluster housing units should relate to one another and have a similar scale. Multi-family units tend to be very large-scale buildings, with unarticulated facades, long rooflines and repetitive groups of windows. This presents an institutional image. To achieve a more residential image, modulate the form by changing the roofline, manipulating the front facade and adding design elements such as bay windows and porches.

4.5.2.9 Entrance

Individual entrances to housing units should clearly define the transition from public to private space by the location of sidewalks, porches and landscaping and by the articulation of the building.

- Each entrance should have an individual sidewalk approaching each door.
- Locate separate entrance doors on opposite sides of an elevation and orient entrances toward the street, wherever possible.
- Provide an entrance canopy or porch designed to match the scale and architectural character of the unit.
- Incorporate small planting beds near the entrance to each unit to provide the opportunity for individuals to personalize their unit with flowers or low shrubs.

4.5.2.10 Style

Style refers to the overall image of an individual building. Building materials, fenestration, rooflines, and architectural detailing all combine as visual clues to express architectural character or style.

Housing clusters should express one particular style. All buildings within a cluster should express a consistent use of materials, bay windows, porches, garages, and a similar variety in rooflines. See TRADOC Roofing Policy HQ TRADOC letter ATEN-FE 27, June 1984, Roofing Policy.

4.5.2.11 Renovation and Additions

Architectural form and character of any addition or renovation should be compatible to the structures to

which they are attached. Basic character, materials, shape, size, scale and massing should match, though not necessarily be copied.

4.5.2.12 Maintenance Considerations

Buildings should be designed to minimize life cycle, energy and maintenance costs through proper selection of forms, materials and construction details. (Refer to DOD 4270.IM, December 15, 1983).

4.5.2.13 Climatic Considerations

The temperate climate of Fort Leonard Wood should be considered during the design process. Provide insulated building walls and double glazed windows. On south facing windows and entrances utilize roof overhangs, porches and deciduous trees to minimize solar gain during summer months. Create protected sun pockets for outdoor use during winter months by orienting active pedestrian areas to the south. Utilize evergreen plantings and walls to provide windscreens on north facing buildings and entrances. Plant deciduous trees along east, south and west buildings walls to provide desired shade during summer months. Where possible, all windows should be operable to encourage full natural ventilation. See TM 5-735, Engineering Weather Data.

4.6 CIRCULATION

4.6.1 Overview

Housing areas are located at the outer perimeter of the post. The family housing areas are served by a system of curvilinear residential streets that connect to secondary roads at neighborhood entrances. The basic organization of the road system and hierarchy support the suburban neighborhood image of the housing zone. However, a lack of consistent streetscape treatment weakens the visual clarity of the street hierarchy system. Liabilities include:

- Some residential areas and streets open directly onto primary roads, such as along Indiana Avenue.
- Undefined street hierarchy within family housing areas, particularly the NCO-Junior Officers area.
- Inconsistent planting treatment to do not reinforce the circulation system.

4.6.2 Objectives

The visual quality of the vehicular system can be much improved through consistent streetscape treatment. Streetscape improvement can be achieved by observing the following objectives within the housing zone:

- Provide adequate buffer and separation between residential areas and primary roadways.
- Reinforce street hierarchy through consistent and appropriate streetscape design treatment.
- Establish street hierarchy within all residential areas.
- Improve visual unity of the street system through consistent street tree plantings.

4.6.3 Roadway Hierarchy

Roads can be grouped into four general classifications for use in describing the road system for the post. These classifications are primary, secondary, tertiary and rural. Primary roads connect major activity centers within the installation. Secondary roads connect primary roads with individual use areas and tertiary roads. Tertiary, or residential roads handle local traffic. Rural and service roads handle specialized, limited traffic, and serve training and recreational areas in the perimeter open

space zone. These classifications relate directly to traffic volumes and should be reinforced through the treatment of streetscape elements, such as road width, planting, lighting, signage and site furnishings. For an analysis with recommendations for roadway improvements, refer to the Traffic Engineering Study, TE 84-6a-55.

4.6.3.1 Primary Roads

Primary roads, such as Missouri Avenue, do not directly enter the housing zone. But because primary roads enclose the perimeter of many housing areas, transitional buffer zones are of particular concern. For edge and access treatment guidelines, refer to the roadway section of the open space zone, section 5.6.

4.6.3.2 Secondary Roads

Secondary roads such as Pulaski, Indiana and Buckeye Avenues connect residential areas with primary roads. Secondary roadway treatment within the housing zone should be treated as follows:

- Secondary roads should have a maximum of two moving lanes, 10' to 12' wide with a minimum 5' to 6' shoulder at each side. Road right-of-way should be a minimum 60' wide.
- Roadways should be defined with concrete curb and gutter.
- Radius at intersections with other secondary or tertiary roads should be a minimum 20'.
- On-street parking should be prohibited.
- Intersections should be at 90 degrees with proper sight distances.
- Sidewalks should be separated from the adjacent roadway by a 5' to 10' wide planting strip.
- Buildings should be set back a minimum of 60' from the edge of the road. Side yards and backyard common areas should be buffered from the road by plantings.
- Avoid direct access to abutting properties and parking lots in this zone.
- Playground and recreational facilities should be setback at least 30' from the road and be separated by fencing and/or buffer planting.

- Street lighting, signage and plantings should reinforce the moderate to slow traffic speed and adjacent land uses. Signage, light poles and utility elements should be at least 2' from the edge of the road.

4.6.3.3 Tertiary Roads

Tertiary roads within the housing zone should be divided into two sub-groups; through neighborhood streets and local/cul-de-sac streets. Through streets within the housing areas connect local traffic with secondary roads. Examples of through tertiary roads include: Barkley and Forrest Streets, Delafield Drive and the loop drive at the Barrack Complex. Local and cul-de-sac streets intersect through neighborhood streets and serve the abutting properties. Examples of local tertiary roads include: Hatter and Funk Streets, Goethals Drive, Montrose Place and Totten Street. Streetscape treatment should be handled slightly differently for the two types of residential streets in order to facilitate circulation and distinguish roadway hierarchy.

- Tertiary roads should have a maximum of two moving lanes of 8' to 10' wide. Through streets may have an additional 10' wide parking lane in family housing areas only. All tertiary road right-of-ways should be a maximum of 50' wide.
- Tertiary roadways should be defined by a rollback concrete curb and-gutter.
- The turning radius of tertiary roads at intersections with parking lots should be a minimum of 15'.
- On-street parking should be limited to parallel parking for visitors on one side of through tertiary streets within family housing areas. On-street parking should be prohibited on through tertiary streets in barracks areas. Parking bays are allowed along local and cul-de-sac streets, but parallel parking should be prohibited.
- Intersections should be at 90 degrees. Plantings, fences, buildings, signage and other design elements should not obstruct vehicular sightlines.
- Sidewalks may be adjacent to the street, but a minimum 5' wide planting strip as a buffer

between street and sidewalk is preferred. Sidewalks should be provided along at least one side of all streets, and may be provided on both sides through streets and in pedestrian node areas.

- Street lighting, signage and planting should reflect the design speed and character of the residential roadway. All signs, light poles and utility elements should be set at least 2' back from the road.

4.6.4 Streetscape Improvements

Streets provide the primary vantage point in which visitors observe the post. A consistent use of streetscape design elements will minimize visual clutter, provide an attractive roadway and properly convey street hierarchy to orient visitors to the post.

4.6.4.1 Street Trees

Street tree plantings visually define and reinforce the basic roadway organization of the post. They provide the ordering element that orients and directs vehicular traffic and defines roadway hierarchy. Street trees provide visual scale, reduce roadway glare and heat gain, physically separate pedestrian and vehicular circulation and reduce the visual impact of parking lots and overhead utility lines. Plantings should also be used to buffer buildings, playgrounds, recreations areas and backyard common areas from adjacent primary and secondary roads.

To emphasize visual effect and channel views, a single row of regularly spaced large deciduous trees should be planted along each side of secondary roadways in the housing zone. Nominal variations will occur to accommodate curb cuts and utilities. The recommended spacing of secondary street trees is between 30 to 40 feet on center. Tertiary streets should incorporate irregular groupings of street trees spaced in a single line 25 to 40 feet apart. Spacing between each grouping should not exceed 100 feet except to avoid curb cuts. A minimum setback of six feet from the back of curb should be maintained for all street trees. See Planting, section 3.11.

4.6.4.2 Signage

A coordinated signage system should be utilized to provide direction and convey regulatory information to motorists. See Signage, section 3.12.

4.6.4.3 Lighting

Street lighting should reinforce road hierarchy and improve public safety and security. Light poles should be uniformly spaced on one side of the street and setback a minimum distance of four feet from the back of curb. Aluminum poles and fixtures should be of a uniform type and height with a dark brown anodized finish. All light sources should be standardized. Selection of pole fixtures, lighting source and placement should correspond to roadway hierarchy. See Lighting, section 3.13.

4.6.4.4 Site Furnishings

Site furnishings include benches, trash receptacles, bike racks, tree grates, walls and static displays. Site furnishings should fulfill an intended function and contribute positively to the visual quality, image and identification of the post. Select site furnishings standards that complement one another and produce a coordinated visual image when clustered. See Site Furnishings, section 3.14.

4.6.4.5 Utilities

Within the housing zone all utilities should be placed underground. See Utilities, section 3.15.

4.6.4.6 Pedestrian Crosswalks

Pedestrian ramps and crosswalks should be provided at all intersections within the housing zone. Crosswalks should be defined with broad white painted strips. In barracks areas, crosswalks should be provided within parking lots. Major pedestrian crossings should be well identified with signage. Crossings should be barrier-free by providing a drop curb or sloping the entire sidewalk with a a:12 maximum slope. All crosswalks should comply with ADA requirements. See Walkways, section 3. 8 and Chapter 13 of DOD 4270.IM

4.6.4.7 Driveways and Parking Bays

Provide proper connection and setbacks between streets or drives and parking bays. Locate driveways a minimum of 35 feet from the intersection of tertiary streets and 50 feet from the intersection of tertiary streets with secondary or primary roadways.

4.7 PARKING

4.7.1 Overview

The majority of housing unit at Fort Leonard Wood can be characterized as suburban neighborhoods set amidst wooded rolling topography. The density of housing varies from single-family homes to the multi-unit buildings of Specker Barracks. The amount and type of parking varies depending on the density of housing units. Generally, the layout and treatment of parking lots detracts from the visual quality of the housing zone due to the following issues:

- There is a lack of screening and island planting for parking bays and lots.
- Unrestricted on-street parking is undesirable in family housing areas.
- Placement of utility and service elements in highly visible locations detracts from the overall visual image of the housing zone.

4.7.2 Objectives

Reorganization and landscaping of the parking areas will visually improve the overall appearance of the lots. Improvements should complement and enhance the visual quality and character of the housing zone by observing the following objectives:

- Reduce the visual impact of parking areas through proper location, layout, screening, and landscape plantings.
- Reduce and limit the use of on-street parking.
- Reduce visual impact of utility elements through proper location, screening, and landscape plantings.

4.7.3 Type of Parking

The size and type of parking facilities is directly related to the type of housing served.

4.7.3.1 On-street parking

Parallel parking and 90 degree parking bays are presently utilized in the housing zone. All on-street parking should be restricted to visitor use within the family housing areas. In existing single family and

duplex housing areas, parallel parking for visitors is allowed on one side of tertiary streets. Where 90 degree parking bays are used in four family unit areas, parallel on-street should be eliminated. The use of on-street parking in high density, multi-unit housing areas should be eliminated when possible.

4.7.3.2 Off-street Parking

Off-street parking within the housing zone includes individual driveways, court parking, and parking lots that relate to individual buildings and building clusters. Off-street parking should be the predominant method of parking within high density housing areas.

4.7.4 Area Requirements

The total quantity of parking in any one location will vary with specific needs of each type of housing unit. Criteria for determining the number of parking spaces required for non-organizational vehicles in various types of facilities is listed in Table 4-1 of DOD 4270.IM.

- Allocate 400 square feet per car (including access drives and planting islands) for initial planning purposes.
- Provide adequate walkways to facilitate pedestrian access.
- Small lots are preferable to large lots. Provide planting islands with trees every 10 to 15 spaces and planting medians to separate large lots.

4.7.5 Location Requirements

Locate off-street parking convenient to building entrances. Provide a visual connection and sense of arrival between parking spaces and individual unit entries. Whenever possible, design parking areas around existing tree masses. In UOQ areas, locate parking areas so that pleasant views and outdoor use areas are not blocked. In high density barracks housing areas, parking should be at the periphery zone to minimize negative impact within courtyard areas.

Avoid locating parking areas directly adjacent to building walls. Allow an adequate space for foundation plantings, walkways and entrance courts, typically a minimum of 20 ft should be observed. Locate access points to parking lots well back from roadway intersections. When

possible, align parking lot entrances to minimize the negative effect of curb cuts and provide safe intersections.

4.7.6 Parking Layout

4.7.6.1 On-street Parking

Head-in 90 degree parking bays should be restricted to tertiary streets in multi-family housing areas. Off-street parking courts are preferred for multi-family housing areas.

Generally, on-street parking should be limited to parallel parking on tertiary streets within the single family and duplex housing areas. Stalls should be a minimum 25 feet long and 10 feet wide from the face of the curb. On-street parking should be limited to one side of the street and reserved for visitor use only. Parking stalls should be kept to a minimum of 50 feet from intersections. Signage should be uniform and comply with standard signage system guidelines. See Signage, section 3.12.

All court parking should be laid out with 90-degree stalls. Double loaded courts should have aisles of adequate width to facilitate two-way traffic. Courts may be aligned parallel or perpendicular to the road, depending on topography and site restrictions. A minimum 20'0" planting strip should be provided between parking and street or housing units. Parking in single loaded courts should be provided on the side that relates to the units. Use integral concrete curb and gutter continuously throughout the parking area. Curb inlets should be provided to handle storm water runoff. The turning radius at curb cuts should be a minimum of 18 feet. Provide for handicap accessibility and comply with ADA requirements. See Chapter 18 of DOD 4270.1 M.

4.7.6.2 Off-street Parking

Off-street parking lots are provided in the UOQ and Troop Housing areas. To provide easy, convenient and consistent circulation, all parking areas should be laid out with 90-degree stalls. Driving aisle should permit two-way traffic. The orientation of circulation lanes in large parking lots is important in reducing pedestrian and vehicular conflicts. Circulation aisles should be oriented perpendicular to building

entrances. When this is not feasible an internal walkway delineated by islands should be used.

Parking lot circulation should be strictly internal. Avoid using adjacent roads to provide access from bay to bay. Parking lot entrances and exits should be kept at the *minimum necessary for peak hour use*. A minimum 15' turning radius should be used at curb cuts, with a 20' minimum radius if trucks enter the lot. Curb cuts should be located a minimum of 50'0" from road intersections. A minimum of 20'0" should be provided as a planting strip between the road and parking lot.

Minimize signage requirements by providing one sign to identify the lot entrance and building served. Reserved parking stalls should be identified with curb or pavement marking. Signs within parking areas should be used to identify parking restrictions.

Concrete pads for motorcycle parking areas must be incorporated into the design of the parking lots. Utilize topographical changes to advantage, where possible, to reduce the visual impact and for separation from the road and adjacent buildings. On large lots where the topography is relatively flat, use berms and landscaping to screen lots from the road.

4.7.7 Design Details

4.7.7.1 Paving

Parking surfaces should generally be asphalt. In low use and overflow areas, grass pavers should be considered to help reduce the visual impact of the lot. Gravel or cinder lots should be avoided, except during construction periods.

4.7.7.2 Drainage

Parking lot drainage should be handled by means of an underground drainage system with curb inlets. Sheet drainage to the low edge of the lot is preferred over center swales with area inlets.

4.7.7.3 Curbing

Use a rollback integral concrete curb and gutter continuously through the parking area. Refer to post standard. Where sidewalks occur at the head of parking stalls, either provide wheel stops or increase walkway pavement width by 2'-6" to accommodate

bumper overhang. This will minimize maintenance, by eliminating grass strips, and improve pedestrian safety, particularly along parking bays within the multi-family unit areas.

4.7.7.4 Islands/Screen Planting

Within large parking lots, islands with trees are to be provided every 10-15 spaces to provide human scale and screen the parking area. Landscape plantings shall be provided for all parking areas with a minimum of two per three cars. Screen plantings of trees and shrubs and berms should be incorporated along the perimeter of large parking lots in an informal manner to blend with the surrounding woodlands. The introduction of street trees along roadways in family housing areas will reduce the negative visual impact of on-street parking. Screening and landscaping should be done around utility elements (such as dumpsters and transformers) to reduce their visual prominence and impact.

4.7.7.5 Parking Lot Lighting

Locate light fixtures out of the way of traffic and parking stalls. Light poles should be located in center or side islands whenever possible, and placed on a 12" raised concrete foundation to prevent damage from vehicles. Within paved areas, increase the height of the concrete foundation to three feet. Parking lot fixtures should be anodized dark bronze aluminum shoe box type on square tapered poles with a mounting height of 30 to 40 feet. High pressure sodium should be the standard light source. See Lighting, section 3.13 for illumination levels.

4.8 WALKWAYS

4.8.1 Overview

The walkway system within the housing zone should provide pedestrian connections between units, parking and adjacent facilities, such as schools and playgrounds. The pedestrian circulation system should visually reinforce the suburban residential character of the zone. Within family housing areas, walkways should generally parallel the street layout, and are conducive to use by children. Within Specker Barracks an internal walkway network connects the complex of buildings within a courtyard environment. These existing walkways do not always provide a continuous route and their treatment is often compromised by vehicular intrusions.

4.8.2 Objectives

The walkway treatment should be pleasant and inviting as well as provide safe and convenient pedestrian connections between housing and adjacent land uses. Specific objectives for walkway system improvements include:

- Provide a safe, clear and convenient walkway system.
- The walkway system should provide a continuous pedestrian circulation to adjacent facilities and zones.
- Utilize landscape planting to add visual interest, shade and buffering.
- Utilize site furnishings to provide interest and pedestrian amenities along walkways.
- Provide consistent treatment of site elements (mail units, dumpsters, and phone booths) to minimize visual clutter.

4.8.3 Hierarchy

Provide a continuous circulation network that connects the various buildings and associated facilities within the housing zone in a visually clear and efficient manner. The network should consist of a hierarchy of walkways based on volume and type of use. Major facilities and primary pedestrian generators should be connected by a system of primary walkways. Secondary walkways should connect individual buildings and use areas to the

primary walks. Tertiary walks are best described as recreational paths connecting residential areas with recreational land uses.

4.8.3.1 Primary Walks

Primary walks should be a minimum of 10' wide and accommodate four pedestrians walking side by side. These walks are designed for high volume use and provide connections between major activity centers. Primary walks should be gray concrete with a broom finish surrounded by a smooth trowel edge in a windowpane pattern, or an exposed aggregate finish. Appropriate lighting, pedestrian amenities and refined landscape features should be located along the walkway. Vehicular use of walkways should be prohibited to emergency vehicles. Specker Barracks is the only area within the zone to generate pedestrian use volumes requiring primary walks.

4.8.3.2 Secondary Walks

Secondary walks should be a minimum 6'-0" wide and accommodate two persons walking side by side. These walks are designed for moderate volumes and provide direct connections between housing units. Secondary walks should be concrete with a broom finish. Secondary walkways in UOQ and family housing areas should have residential lighting levels, fewer pedestrian amenities and quality landscape features along the walk than secondary walkways in higher density areas such as Specker Barracks. Residential sidewalks connecting units to secondary walkways should be a minimum 4' in width.

4.8.3.3 Tertiary Walks

Tertiary walks are low use, recreational paths connecting residential areas with schools, playgrounds and recreational areas. These paths are generally less direct and more scenic in character. The recreational paths should be designed for joint pedestrian and bicycle use and be a minimum of 6'-0" wide and constructed of broom finish concrete or asphaltic concrete with steel edging or a tapered edge. See Bikeways, section 3.9. Nature paths should be a minimum of 4'-0" wide and may be surfaced with wood chips.

4.8.4 Placement

The walk network should be a continuous, unbroken system that is clearly and easily understood while providing the pedestrian with safety and comfort. By identifying the location of primary pedestrian generators and destinations, walkways can be placed to take advantage of the most direct routes and provide quick and efficient access between uses.

Walkways within this zone should generally be informal and curvilinear, reflecting the residential character and layout of the streets and buildings. Primary walks within the Specker Barracks areas may be linear and more formal. Walkways should be located so that they do not conflict with utility systems, such as steam lines and vents.

A planting strip between 5' and 15' wide should be used when primary and secondary walks parallel roadways. Street tree plantings within this grass strip provide shade and buffer the pedestrian from vehicular circulation. Walkways should be provided on both sides of major roads and through streets where vehicular traffic is higher. In lower density areas along local streets, it is allowable to have a walkway on only one side of the street.

Walkways in Specker Barracks, should utilize a curvilinear layout that reflect the direction of desired pedestrian flow and reinforces the informal architectural character of this area. The existing angular walkway layout of this area is not based upon actual pedestrian circulation paths and fragments the common open space. A more curvilinear walkway layout along actual paths of pedestrian circulation will better serve the complex and allow residents to make better use of the open space between buildings.

Provide a minimum 10' wide planting bed between buildings and walkways within UOQ and troop housing areas. A minimum 30' distance between sidewalk and residential units should be observed within family housing areas.

4.8.5 Pedestrian Amenities

4.8.5.1 Crosswalks

Crosswalks should be used to provide safe and convenient street crossing where walks and

roadways intersect. Crosswalks should be located at road intersections and be marked with broad white painted stripes and pavement signage. Barrier-free access should be provided at all pedestrian crosswalks through the use of drop curbs or by sloping the entire width of the walk to meet the street grade. Sloping the walk is the preferred method of barrier-free access for major walkways. The intersection of two walkways should be adequately sized to handle pedestrian cross traffic. A minimum 4' radius is recommended.

4.8.5.2 Building Access

Buildings in the housing zone are not required to have barrier-free access. However, barrier-free access to housing units and complexes should be provided on a limited or "by-need" basis as described in DOD 4270.IM - 18.2/3A. When providing ramps at building entrances, where steps occur between the walk and building, the maximum gradient should be 8% or less with a minimum width of 3'-0". Ramps should be integrated into the overall design of the building entrance and not appear "tacked-on".

For security purposes buildings housing a significant number of units should not have an unobstructed path that would accommodate vehicular access. Utilize plants, trash receptacles, planting beds, and other site furnishings to obstruct direct vehicular access.

4.8.5.3 Exterior Steps

Exterior steps, when needed for grade changes at building entrances or along a walk, should be the same width as the abutting walk. The minimum width should be 4'-0" and steps should have at least three risers. All steps in a series should have a uniform tread width and riser height. The recommended dimensions for exterior steps are a 5-3/4" riser height with a 14-1/2" wide tread. Steps should have solid risers with non-slip treads. Handrails and lighting should be provided to assure safe access.

4.8.5.4 Handrails

Handrails should be provided on both sides of exterior steps and should extend past the tread at both the top and bottom of the steps. Handrails

should be tubular metal with rounded ends turned into the wall.

4.8.5.5 Pedestrian Bridges

Pedestrian bridges which are required to cross drainage swales and streams within the housing zone should be coordinated within the design of the overall pedestrian system. Walks leading to and from the bridge should have smooth, even gradients. The width of the bridge should match the width of the abutting walk and be a minimum width of 4'-0". A standard bridge design should be used throughout the post. The bridge should be a simple, well-designed wooden bridge that fits the rural character of the post and reflects army excellence in its design. Bridges should be set at an elevation that will allow the design storm to pass beneath unrestricted.

4.8.5.6 Street Furniture

Walkway design should be coordinated with street furniture to accommodate pedestrian needs. Street furniture should generally be clustered at rest nodes adjacent to the walkway and near walk intersections. See Site Furnishings, section 3.14.

4.8.5.7 Lighting

Walkways and exterior steps should have a level of illumination that insures safe night-time use. See Lighting, section 1.13.

4.8.5.8 Planting

Landscape plantings should provide shade and visual interest along the walkways as well as separating and buffering the walk from vehicular traffic. See Planting, section 3.11.

4.9 BIKEWAYS

4.9.1 Overview

A well-planned bikeway system can encourage bicycle use and establish bike routes as an alternative form of transportation. The wooded character of the installation provides an excellent setting for development of a bikeway system.

The bikeway system should consist of safe, well-marked and convenient routes with proper amenities, including secure bicycle parking facilities at key destination points. The system should provide a basic network of designated paths that interconnect major facilities and building groups with housing bike paths. The bikeway network should provide for both destination-oriented travel, with direct convenient paths; and recreational use with meandering scenic paths.

In the housing zone, the bikeway system should serve both adults and children. Bike paths should be utilized to provide convenient, safe and pleasant connection between housing areas, schools and recreational/playground areas. These paths should provide a safe alternative to riding in the street.

4.9.2 Hierarchy

Primary bikeways should share street right-of-way lanes. The routes should be designated by pavement marking and signage. Bikeway lanes should be one-way and located between the curb and traffic lane of primary and secondary roads. On-street parking should be prohibited on all roadways designated for shared bikeway use. See Circulation, section 3.6. An associated network of recreational bike paths should connect housing areas, schools and recreational facilities into the primary bikeway system.

4.9.2.1 Primary Bikeways

Bikeway lanes along primary roads should be a minimum 6' in width; bike lanes along secondary roads should be a minimum 4' width. Bike lane striping should be of a consistent 12" wide solid white line. The solid line should become a dashed line within 50 feet of all intersections. Bikeway signage and stenciled bikeway pavement graphics should be regularly spaced along the route.

4.9.2.2 Recreational Bike Paths

Within the housing zone bike paths should be shared as pedestrian paths. These paths should be located primarily in open space areas within the zone and be separated from roadways. Bike paths should be located to take advantage of views and natural features. Bike paths should be a minimum 6' wide, 8' in high use areas, and be constructed of asphalt with a steel edging or a tapered edge. Paths should serve walking and jogging uses as well as bicycling.

4.9.3 Bikeway Elements

4.9.3.1 Clearance

Provide a minimum 2'-0" horizontal clearance from edge of bikeway to any stationary object or grade change. Provide vertical clearance of 8'-6" minimum, 10'-0" preferred, from surface of bikeway to any overhead stationary object.

4.9.3.2 Obstacles

Drainage grates and utility covers present on grade hazards to bicyclists. All grates and covers should be flush with existing grade. Drain grates should be located with openings set perpendicular to bike paths to eliminate the hazard to bicycle wheels.

4.9.3.3 Signage

Bikeway signage should conform to installation's standard signage system. See Signage, section 3.12.

4.9.3.4 Bicycle Parking

Locate parking areas at major destination points in the UOQ and Specker Barracks areas, preferably within 50 feet of main entrances. Bicycle use should be periodically monitored and analyzed to provide adequate parking racks at the proper locations. Bicycle rack areas should be located convenient to main entrances and in a visually supervised area.

Locate bicycle parking areas on concrete pavement adjacent to walkways. Avoid locating bicycle parking within automobile parking lot areas. Bicycle parking areas should be designed for efficient use and be visually attractive. Plantings should be used to shade parking areas without blocking observation of the area. See Planting, section 3.11.

Use a metal tubular ribbon-type parking rack with a dark brown powder coated or galvanized finish. Parking area should be adequately sized to provide 3' clearance between bicycles and edge of walkway.

4.10 COURTYARDS & PLAZAS

4.10.1 Overview

The goal of the housing zone is to create neighborhoods with unique identity, and visual separation from the remainder of the post. These neighborhoods should be organized to convey a sense of privacy while providing the security and group identity of a community. The development of courtyards and plazas in multi-family and troop housing areas can help achieve this goal by providing privacy, transition zones and open space buffers.

Within the housing zone, there are three distinct groups. These are: (1) family housing area such as the 4200-4600 area and the 7000-8000 area, (2) UEPH housing such as the 4100s and (3) troop housing such as Specker Barracks.

4.10.1.1 Family Housing

Within the family housing areas, designated play areas are not within view of housing units. A direct visual relationship would allow parental supervision and encourage the use of existing open space areas for passive use.

The primary goal of open space within family housing is to provide privacy. Each unit has a private yard and entry zone. Public open space in this area separates the units from primary streets and the individual neighborhood from one another and the remainder of the post. Open space categories most applicable to this zone include the development of entry and recreational courts.

4.10.1.2 UEPH Areas

There is a greater emphasis on shared open spaces within the UEPH units. Within these areas open space should encourage community use by providing areas for social gatherings. The most applicable open space categories for this zone include entry, side and recreational courts.

4.10.1.3 Troop Housing

The most communal of all areas, the troop housing area relies heavily on well-designed outdoor spaces. Open space within troop housing areas should

provide public and private open spaces. Applicable open space categories should include recreational courts, private and semi-private entry courts, side courts and public plazas.

4.10.1.4 Neighborhood Entrance

Neighborhood entrances should buffer homes from primary roads and define the area as a unique community. Neighborhood entries should be designed as public open spaces that convey an inviting park-like atmosphere. The use of decorative walls, signage and landscaping can provide neighborhood identity and pride. Architectural elements must be compatible in design and materials with the remainder of the post.

4.10.1.5 Entry Court

Private entry courts can be found at buildings with individual front entrances such as 4850 to 4854. Semi-private entry courts define shared entrances of multi-family housing units. Both of these types of entry courts provide an important transition zone between the public domain of the street and the private living spaces of residents. Shared entry courts can also provide an informal gathering space for socialization. The development of these spaces is particularly important in developing a sense of community within multi-family and dormitory-style housing areas.

Entry courts can be formal or informal in design. They can be any shape and may be defined architecturally by building walls. Garden walls, landscaping, and special paving patterns can be used to provide a sense of arrival and enclosure. Shared entry courts should provide privacy and act as community green space. Incorporate low walls or benches to encourage informal socialization.

4.10.1.6 Side Court

Side courts are outdoor spaces in multi-family areas that are developed into gardens or courtyards. They may be developed in between buildings, next to a building, or next to a path. Private side courts offer a place to sit, to congregate and to watch surrounding activities.

The space can be any shape or size, and the layout may be designed in a formal or informal manner. A minimum of two boundaries, either parallel or perpendicular to each other, define a side court. These boundaries may be expressed in terms of building walls, garden walls, landscaping or a change in paving pattern. Side courts should have picnic tables and an overhead shade trellis or roof.

4.10.1.7 Public Plaza

The incorporation of public plazas can offer a much-needed area for socialization in multi-family housing communities. Plazas should be located along pedestrian pathways and can be partially screened to create semi-private spaces. The plaza may be any shape and may be formal or informal in design. The boundaries should be clearly designated, and may be expressed by the use of grade changes, terraces, a low wall or landscaping. Each plaza should have a focal point that can be a natural element such as water or a specimen tree, or a symbolic element such as a statue. Provide seating areas and bulletin boards within the plaza. All materials should be vandal proof.

4.10.2 Materials

The horizontal plane of a plaza or courtyard can be composed on one material used in different ways to provide an assortment of textures, patterns and visual effects. To reinforce the suburban image within family housing and UEPH areas, the majority of the ground plane should be lawn areas and planting beds. Higher density troop housing areas can project a less suburban image and can incorporate a greater amount of paved surfaces in relation to green space. Paving patterns should relate to the overall size and character of the exterior plaza or courtyard. Informal plazas should have curvilinear patterns while formal plaza should have geometric patterns.

4.11 PLANTING

4.11.1 Overview

In general the housing zone is visually integrated with the wooded rolling topography of Fort Leonard Wood. Family housing units and clusters are sited along a system of curvilinear streets following the natural contours of the land. Higher density developments such as Specker Barracks and other UEPH areas are not as successfully integrated with the natural landscape. These higher density housing areas present the following visual and environmental problems with respect to parking and vehicular circulation issues:

- There is a lack of consistent street tree plantings to define street system hierarchy and reduce the visual impact of parking lots and on-street parking.
- A lack of effectively used green space in Specker Barracks.
- A lack of visual separation and screening of housing units from secondary streets, such as Indiana Avenue at Buildings 7000, 7001 and 8900 along Buckeye Avenue.
- A general lack of adequate screening of utility and service areas.
- A lack of effective screening of non-housing facilities within the zone such as Building 2383.

4.11.2 Objectives

Utilize plantings to improve the visual and environmental qualities throughout the housing zone. Existing background and perimeter treatments provide an attractive image, but much improvement is needed in the foreground or street side of housing units. Planting program objectives for the housing zone include:

- Establishment of street trees to define street hierarchy and visually separate the intrusion of on-street parking.
- Utilize landscaping to enhance the residential character of the high density UEPH and troop housing areas.

- Establish adequate setbacks and incorporate screening treatments for housing areas that are adjacent to primary and secondary streets.
- Use plantings to visually screen service/utility elements and non-housing facilities.
- Preserve and integrate existing tree stands during the design and layout of new housing facilities.
- Incorporate new tree plantings along existing hillsides to preserve these wooded areas for future generations.

4.11.3 Planting Design

4.11.3.1 General Treatment

Planting within the housing zone should generally reflect the natural character of the surrounding woodlands. The planting treatment along perimeter areas should be in a naturalized character utilizing native plant materials. The landscaping of individual housing units should incorporate ornamental trees and shrubs for visual accent and seasonal interest. In family housing areas, permanent shrub and flowerbed plantings along the front façade will soften and enhance the appearance of individual units and the neighborhood as a whole. Plant materials and edge treatments should conform to post regulations. Plantings in high-density troop housing and UEPH areas, should utilize a mix of ornamental and native plant materials to establish human scale, provide visual interest and define use areas. Select thorn less and non-poisonous plants for use in the housing zone. See the plant matrix for appropriate selections.

4.11.4 Visual Quality

4.11.4.1 Definition of Visual Areas

Within the family housing areas, provide groupings of deciduous and evergreen shrubs and trees to visually screen and physically separate primary and secondary roads from housing areas. Use deciduous tree plantings to direct pedestrian circulation along the seemingly random walkway system of Specker Barracks courtyards. Within these court areas, group plantings to enclose and frame lawn areas as groves, rather than scattering trees randomly. Use perimeter plantings to define informal recreational lawn areas.

Use tree and shrub plantings to establish buffers between playground and recreational areas within the family housing areas. Planting treatment should visually connect, rather than isolate, playground areas from the surrounding neighborhood. Limit the use of ornamental trees and shrubs to picnic and patio areas within UEPH groups. Enhance pedestrian plazas within Specker Barracks area through the use of evergreen shrubs and ground covers and flowering trees and shrubs to provide scale, shade and visual interest to these areas.

4.11.4.2 Reinforce Vehicular Hierarchy

Provide landscaped buffer zones between primary and secondary streets and family housing units. Screen plantings should provide visual separation and privacy between the back and sides of units, and adjacent roadways. Utilize small to medium sized deciduous street trees to screen on-street parking along tertiary streets. Select larger street trees for use near multiple story buildings in the housing zone, such as Specker Barracks. See Circulation, section 3.6.

Street tree plantings in family housing areas visually separate walkways from the street and provide visual interest. Utilize a combination of shrubs and trees to provide seasonal interest, shade and visually contain pedestrian plazas troop housing areas.

4.11.4.3 Define and Screen Parking Areas

Provide screen plantings along the perimeter and shade trees within the islands of family housing area parking courts. Use a combination of deciduous trees and evergreen and flowering shrubs to screen parking lots in UEPH areas. When parking lots are located between street and buildings, the planting treatment should provide a visual transition. Irregular groupings of medium to large deciduous trees will establish a greenbelt at the outer perimeter of Specker Barracks parking lots. Parking lots in the housing zone should be treated in more formal manner with regularly spaced street trees along drives and in islands. See Parking, section 3.7.

4.11.4.4 Screen Undesirable Views

Screen all utility/service areas such as loading docks, transformers and dumpsters within the housing zone

with evergreen and deciduous trees and shrub masses and screen walls and fences. See Site Furnishings, section 3.14.

4.11.4.5 Building Entries and Foundation Plantings

Flowering and evergreen trees and shrubs can be utilized in foundation plantings to frame the entrance to family housing units. Utilize a combination of evergreen shrubs and flowering trees or shrubs to emphasize the main entrance to UEPH buildings. Groupings of deciduous or evergreen trees and shrubs should be used to visually frame the corners of buildings. In the Specker Barracks complex, use small to medium flowering trees to frame entrances and larger shade trees to frame buildings. Incorporate shrubs plantings at key building entrances.

4.11.5 Environmental Quality

When properly placed plants can provide environmental benefits, as well as address visual concerns.

4.11.5.1 Energy Conservation

Use deciduous trees and shrubs at courtyards, buildings and along streets to provide shade, moderate temperatures and reduce glare during the summer months, while allowing solar exposure in the winter. Due to heat build-up and lower sun angles in the mid-morning and late afternoon hours, solar radiation and glare are most effectively controlled by deciduous plantings at the southeast and southwest corners of the area or building to be shaded.

To provide summer shade in this region locate shade trees at an angle 75 degrees clockwise from due south of the area to be shaded. Plantings so located will intercept late afternoon sun at the peak air-conditioning period. Use shade tree plantings in parking lots to reduce glare and moderate ambient air temperatures on the lot. Optimum spacing of parking lot shade trees is 35' to 40' on center.

4.11.5.2 Windscreens

Use a combination of evergreen and deciduous trees and shrubs to provide windbreak protection from prevailing northwesterly winter winds. Windbreak

plantings should be irregular groupings, rather than straight line spacing, to provide more effective wind control and to visually blend with the natural character of the post.

4.11.5.3 Sound Control

Utilize groupings of deciduous shrubs with evergreen trees and shrubs to decrease vehicular traffic noise between primary and secondary roads and family housing areas.

4.11.5.4 Erosion Control

Use a combination of shrubs and groundcovers for plantings on embankments and slopes over 20%.

4.11.5.5 Plant Maintenance

Establishing and maintaining landscape plant material requires regular and routine attention. However, proper analysis of existing conditions, siting, selection of plant materials and detail treatment can minimize routine maintenance requirements while improving visual quality.

4.11.5.6 Trees and Shrubs

Plant material should be properly selected, sited and spaced so that continuous trimming is not required. The mature size of plants should be considered when selection is made.

4.11.5.6.1 Layout

Trees should be spaced at distances adequate to allow mowing equipment between trunks. The shape of planting beds should be simple with adequate radii to accommodate mowing equipment and outlined with a spaded edge.

4.11.5.6.2 Mulching

Mulch rings should be established around all street and lawn trees to retain moisture, and minimize required hand trimming and mower damage to trees. Rings should be a minimum of 3' diameter for trees under 8" caliper and a minimum of 2' radius from trunk for trees over 8" caliper. Mulch should not cover the base of the tree trunk. The perimeter of the mulch ring should be raised like a saucer to aid in the process of

deep watering. All planting beds should be mulched with wood chips or shredded bark mulch to a minimum depth of 3" and be replenished approximately once a year.

4.11.5.6.3 Mowing

Mowing strips should be used around buildings and walls in UEPH areas to eliminate the need for hand trimming. Mow strips should consist of a minimum 1' wide gravel strip with a 3" to 4" depth of brown river gravel lined with steel edging set not more than ½" above grade. Street furniture and utilities (transformers and dumpsters) should be set on concrete pads. All dumpsters shall be enclosed on all sides by a six to eight feet high brick or wood gated screen wall.

4.11.5.6.4 Pruning

Pruning of trees and shrubs is done to ensure well -developed branching, maintain desired shape, and remove dead branches. Pruning is beneficial for old and new plantings. Pruning of existing trees should be done primarily in the event of death, disease infestation due to pests, or damage from storms. Prune overhanging limbs along streets and walkways to avoid obstruction of traffic

As deciduous tree reach a height of 18'-20', maintain a 6' clear trunk. Allow evergreen trees to branch to the ground. Do not prune lower branches for mower access.

Proper removal of the desired branches is necessary to ensure continued health of the tree. The removal of the desired branch is a three-cut process. Start the first cut on the underside of the limb, about one foot from the trunk and saw through one-third of the ranch. Start the second cut on top of the branch, about three inches out from the bottom cut, sawing until the branch splits off at the parallel point of the two cuts. Saw off the stub at the branch collar without damaging the collar.

4.11.5.6.5 Fertilization

Slow release type fertilizers are recommended and should be applied in late September when

root growth is active and in spring, when all growth is stimulated. Prepared fertilizers containing nitrogen, phosphate and potash (N,P,K) are usually sufficient to provide good growth. Nitrogen encourages rapid growth and leaf production. Phosphorus stimulates root growth and formation of flower buds. Potassium increases resistance to disease and winter damage. Soil samples should periodically be taken to determine the amounts required. Application of fertilizers (usually at a rate of 10-6-4) to small trees and shrubs should be in a circle 1-1/2 feet beyond the spread of the canopy. Plant beds and trees should be watered thoroughly afterwards.

4.11.5.6.6 Watering

Trees and shrubs, especially newly planted ones, require greater amounts of water than lawns and should be watered separately. Irrigation of shrub beds and new trees should be applied slowly to avoid runoff. Water should be allowed to permeate the soil five to six inches. Watering of large lawn trees is necessary during times of drought. Application of water should again be slow and deep. The infrequent soakings will reduce competition between the tree and turf roots for water. Watering evergreens is essential during dry winter months as long as temperatures are above freezing.

4.11.5.7 Lawn Maintenance

In order to develop and maintain attractive lawns, procedures for soil analysis, fertilization, aerification, reseeding, watering and mowing must be properly followed.

4.11.5.7.1 Soil Analyses

Prior to the beginning of the growing season, soil analyses of the turf areas must be made to determine the soil pH, and levels of nitrogen, phosphorus, and potassium. Areas known to have done poorly during the previous season should also be checked for problems related to texture, drainage, or erosion. Based on the results specific soil corrections can be determined.

4.11.5.7.2 pH Adjustment

Maintain a pH level of between 6.0 and 6.5 for turf areas. If the pH is below the desired level, lime may be added at the rate of up to 1 ton of lime per acre. For areas with a high pH, sulphur is used at the rate of one-half ton per acre for every one point above the desired pH level. Once the desired amount of lime is determined, it should be applied two to three months prior to the first application of fertilizer. After the correct pH level is achieved, lime may not be needed or applied more than once every three to six years.

4.11.5.7.3 Fertilization

Fertilizers are necessary to produce good growth and help prevent weeds and disease. The three primary nutrients provided by commercial fertilizers are: nitrogen, phosphorus and potassium. These nutrients determine plant color, density of root and shoot growth, resistance to disease and improve tolerance to cold, heat and drought. Fertilization of turf areas should be done after determining nutrient deficiencies based upon the soil testing. Two applications per year in the spring and fall will provide adequate growth. Applications should follow a soaking rain to prevent burning but, to the greatest extent possible should not be made if rain is expected in the following 2-3 days. Applications of roughly 100 pounds per acre are recommended unless tests clearly indicate more is required. Nitro-rich applications are recommended in the spring, and more balanced applications in the fall.

4.11.5.7.4 Aerification

The removal of soil cores allows air, moisture and nutrients to reach the roots more easily, reduces maintenance costs and the amount of water and fertilizer lost due to runoff. Aerification is done annually either between February and early March, prior to fertilization of the lawn, or in mid to late September when root growth is enhanced.

4.11.5.7.5 Vertical Cutting

The removal of thatch, which has accumulated on lawn areas is referred to as vertical cutting. Accumulations of thatch in depths of greater than

one-half inch, causes poor aeration and shallow roots, which worsen drought problems and winter desiccation. Thatch can also cause young plants to weaken and harbor disease and insects. Removal of thatch is recommended in the fall.

4.11.5.7.6 Mowing

Mowing of lawn areas is a frequent and vital part of good turf maintenance. The appearance of turf is affected by the height of the cut. The minimum height of the types of turf grown on the base should not be below two to 2-1/2 inches. During summer months, the minimum mower height should be three inches. Low clipping will starve roots causing the turf to thin out and allow weed infestation. Mowing should occur when the new growth of the grass leaves are equal to twice the desired height. Proper mower settings favor deeper roots and, therefore, increase resistance to drought and reduce watering costs.

4.11.5.7.7 Re-seeding

Reseeding of turf areas becomes necessary when the turf is thin and weedy. Reseeding of areas is generally recommended in the late summer or early fall after de-thatching has occurred. Lawn areas at the perimeter of existing woods, generally 'back yard' areas, should be maintained in a flowing, curved edge line rather than straight lines. Remote open areas within the housing zone, not immediately adjacent to outdoor living space, may be maintained as meadows. Native grasses and wild flowers may be established and mowing limited to twice a year to keep meadows in good condition and minimize fire dangers. Mowing of meadows should be coordinated with use of the area, flowering periods and self-seeding requirements of the plants.

4.11.5.7.8 Watering

Good watering practices are essential to maintain green, healthy and vigorous turf during the growing season. Maintenance costs of turf areas are also reduced with proper watering. Water should be applied to turf areas during early morning hours to reduce evaporation and prevent

disease. Soil should be moistened to a depth of three to five inches. Deep watering twice a month, versus daily light watering, reduces watering costs, and general maintenance of lawn areas. Watering should be done to supplement rainfall.

4.11.5.7.9 Weed Control

Weed control is essential to maintaining a healthy attractive lawn. Normal maintenance procedures such as fertilization, mowing to a proper height, aeration and watering will encourage vigorous turf growth and inhibit weeds.

3.11.7 Plant Selection

The analysis of existing site conditions is the first essential step in the plant selection process. Existing conditions include microclimate, hydrology, soil conditions and orientation. The proper spacing and mature size of plant material must also be considered to obtain the desired effect. For perimeter plantings the existing native vegetation is a good indicator of existing soil and microclimate conditions. Within the housing areas, grading and construction operations can greatly alter soil drainage conditions. These conditions should be investigated and understood before planting is undertaken.

4.11.5.8 Plant Spacing

Mature plant size and spacing are important considerations in achieving the desired effect of a planting. Tree plantings in the periphery areas of the housing zone should be treated in a naturalistic manner with irregularly spaced groupings of predominantly native deciduous trees. Street and parking lot trees should be planted in a more formal, regular spaced manner.

Following is a general spacing recommendation for this zone:

Street and Lawn Trees	Perimeter	Street
• Small	12' to 20'	15' to 25'
• Medium	15' to 30'	25' to 35'
• Large	18' to 35'	25' to 40'
Evergreen Trees		
• Small	6' to 12"	

- Medium to Large.....12' to 20'
- Shrubs
- Large5' to 8'
 - Small3' to 5'
 - Barrier hedges18" to 3'

4.11.5.9 Plant Size

Plant material should be installed at a size that balances immediate effect and survival of the material with cost and ease of handling. The following is a general size recommendation for the mission zone:

- Deciduous Trees
- Medium to large.....2-1/2"-4" Cal.
 - Small7'-8' ht., 1-1/2" Cal.

- Evergreen Trees
- Medium to large.....7'-10' ht.
 - Small5'-8' ht.

- Shrubs
- Medium to large.....24"-48" ht.
 - Small18"-24" ht.

4.11.5.10 Planting Procedures

Proper plant installation is essential for successful results. Refer to TM 5-830-4, Planting and Establishment of Trees, Shrubs, Ground Covers and Vines for standard installation and maintenance guidelines.

4.11.5.11 Plant List

The following plant matrix lists trees, shrubs, groundcovers and turf recommended for use within the housing zone of Fort Leonard Wood. Particular plant culture requirements should be considered in specifying plants from the list. Plants that are favorites of deer have been excluded from the housing zone matrix.

Plant materials used in this zone should generally be native species in the perimeter areas and native and ornamental varieties within the lawn and yard areas.

Generally, plants with unique forms or foliage colors should be used on a limited basis for accent or specimen purposes. All plant material selected for use in the zone should be hardy to the region.

Refer to the "Landscape Use" category on the matrix chart to identify prescribed uses of recommended plants. General plant uses in the housing zone are as follows:

- Street Trees – for use along streets, walkways and within parking lot islands.
- Shade Trees – for use in open lawn areas, perimeter green belt plantings and buffer zones.
- Flowering Trees – for accent use near building and parking lot entrances, and within courtyard, plaza and patio areas.
- Evergreen Trees – for accent, framing and screening uses within the housing zone, particularly at service and loading areas.
- Large Deciduous Shrubs – for accent at multi-story buildings and as buffer plantings.
- Medium Deciduous and Evergreen Shrubs – for hedge and foundation plantings in the housing zone.
- Groundcovers – for use in foundation planting beds and on steep slopes.
- Grasses – for use in naturalized greenbelts and buffer zones.

PLANT SUITABILITY MATRIX

4.12 SIGNAGE

4.12.1 Overview

The existing signage in the housing zone and its sub-districts is of varying design with mixed visual results, and effectiveness. For example, building number signs at Specker Barracks are simple and effective; while the signs at UOQ 4100 Buildings are not legible from parking areas due to inappropriate color of its copy and background as well as the copy size. Lack of adequate directional and identification signs for family housing areas or neighborhoods, and abundance of numbers and occupant name signs on individual units are confusing.

In order to prepare the sign design guidelines, the following documents were reviewed:

- TRADOC Sign Policy, TRADOC HQ. letter ATEN-FE, 18 November, 1985.
- Fort Leonard Wood (FLW) Supp. 1: Appendix A Post Sign Regulation, 25 April, 1986; added to AR 420-70.
- Building Signage, Fort Leonard Wood, FY 85, DACA 41-85-C-0053.
- Installation Design, Army TM 5-803-5.

The publications are referred to in the guidelines by their underlined names only.

4.12.2 Objectives

Sign design, placement and size should reinforce the overall goal of providing a high quality of life for residents of campus-like barracks and UOQ areas, and a suburban neighborhood image for family housing areas. The following guidelines establish a consistent concept and theme for housing area signage:

All new and improved signs should achieve the following objectives:

- To reinforce the image of a campus, all signs within barracks and UOQ areas should be consistent and simple in design. Sign placement should be coordinated, orderly and compatible with building entrances, landscaping and site furnishings.

- In family housing areas names should be established and used for neighborhood identification signs at entry points. Signage design should reflect the architectural character of the neighborhood, and should be coordinated with the entrance area landscaping and street furniture. Signage design should also help establish neighborhood identity.
- To minimize unnecessary visual clutter, signs should be kept to an absolute minimum in number, size and amount of information. Duplication and redundancy of signs should be avoided.
- Signs should be located at key decision points only where they are absolutely needed for safety and guidance (especially first time visitors) to the desired location.
- Only neighborhood identification signs located at entry points should be illuminated at night. Examples include: a sign at the intersection of Pulaski Avenue and Turner Street, and a sign for the Specker Barracks at the Minnesota Avenue entrance.

4.12.3 Design Considerations

The signage design objectives can be reached through observation of the following design guidelines for various types of signs. In order to limit the number and size of signs, buildings and facilities should rely more on visual clues through design of buildings and landscaping, especially within barracks and UOQ areas, and multi-family units. Visitor or main entrances buildings should be in view of major circulation paths.

The number and/or size of directional and individual building signs can be reduced and visitor orientation can be improved by proper identification of streets, and by a common sign for a neighborhood. Subsequent, individual building numbers within the identified area should be simplified and coordinated with street signs providing only that information which is required for a visitor. The coordinated family residential unit's identification sign should be attached to the building. Sequential messages on signs should be, for example:

- "Leiber Heights"
- "Mont-Rose Neighborhood"
- "Mont-Rose Place - House No: X to Z"

Individual building for multi-family and UEPH should have only one building number on a standardized sign. A sign standard should identify individual family housing unit, incorporating building number and a changeable area for the occupant's name. The postal street number should be used on the signs to eliminate confusion created by two numbers. Building number used by the DEH should be in small type size and legible only from close proximity (1/4" or less). The name of the occupant should be in a standard type face of 1/2" size.

Sign standards recommended by Building Signage FLW (FY 85, DACA 41-85-C-0053) should be limited in its use for the most important entry point to the entire group of neighborhoods. For example, a common sign for the housing neighborhoods on the Constitution intersection with South Dakota Avenue; or a sign for Leiber Heights neighborhood areas at Pulaski and Missouri Avenues. Such signs should be approved by the DEH for its design and placement.

The recommended sign standard should be scaled down or modified and approved by the DEH-FLW, for individual neighborhood entrances or sub-districts, to conform to the size and scale as per TRADOC Sign Policy, while keeping the design character for the sub-district as per the objectives.

Also see TRADOC H.Q. letter, ATEN-FE, for Site Furnishings Policy, 25 April 1986, for co-ordination of signage within the zone, as well as the installation.

4.12.4 Sign Type

4.12.4.1 Identification Signs

At the most important entry point to a neighborhood use one sign, as per Building Signage FLW recommendations, at the main entrance drive from the public street. Individual neighborhoods within the neighborhood group should use modified and scaled down version of the same sign standards for all motorist oriented signs.

Individual building and facility signs should be attached to the building whenever possible. Use sign type A-7 or smaller signs for dining and other facilities within the barracks and UOQ housing areas as per Post Sign Regulation.

Motorists and pedestrian walkway and bikeway oriented signs: Wherever possible, such signs should be attached to the building. Use sign type A-7 or smaller signs for dining and other facilities within the barracks and UOQ housing areas as per Post Sign Regulation.

4.12.4.2 Other Buildings and Facilities

Building signs for individual housing unit and multi-family or UEPH, should be standardized in design. Size of the sign containing all information about the building as well as the occupants should be less than 6" x 1'-0" and should be attached to the building, preferably near the main entrance. Use brown background with white letters.

4.12.4.3 Directional-Destination Signs

Information contained on the first sign encountered by the visitor should give general information for the whole group of neighborhoods, and more detailed information should be provided on subsequent signs. Such directional signs should be coordinated to provide information about various destinations. Directional signs should be located at key decision points along major routes likely to be taken by visitors.

4.12.4.4 Motorist Oriented Signs

Use size and color as per the Post Sign Regulation. For entrance corridors such as Missouri Avenue from Main Gate to North Dakota, southern leg of Iowa Avenue from south entrance to South Dakota, etc., and for major roads leading up to residential sub-districts (such as North Dakota, Oklahoma, Constitution, Nebraska, etc.), only when absolutely necessary.

Use smaller signs as per pages 2-1 to 2-2 of TRADOC Sign Policy to direct the users from major roads to the final destination but only when absolutely necessary. Use color as per the Post Sign Regulations. For all motorist oriented signs, limit number of destinations to four on each sign standard.

Pedestrian Walkway and Bikeway Oriented Signs: As per TRADOC Sign Policy: Type G.3, use should be limited along established walkways and bikeways

and only where absolutely necessary to guide first-time visitor only.

4.12.4.5 Regulatory Signs

Motorist Oriented: As per Post Sign Regulations Section A-6. Limit the signs to a minimum for traffic safety and wherever possible, coordinate signs with other streetscape elements to reduce the visual clutter, especially within family housing areas.

Parking Area Oriented: As per Post Sign Regulations - Section A-4g. Such reserved parking signs should be painted as a sign strip on curb or wheel stop or the reserved parking stall pavement itself.

Redundancy of color-coded control and signs should be avoided (for example: no parking signs as well as yellow strip on curb).

Pedestrian Walkway and Bikeway Oriented: Regulatory signs along walkways and bikeways, as well as other pedestrian areas should be limited only for safety related message. Such signs should be minimum in size and integrated with building, or other sign standards, or street furniture and lighting poles. Use sign standards as per TRADOC Sign Policy Regulation Signs F.1 and F.2, and smaller signs - pages 2-1 to 2-6.

4.12.4.6 Information Signs

These signs are inappropriate for the housing zone and should not be used in the housing zone.

4.12.4.7 Motivational Signs

Instead of free standing motivational signs, use of posters and other graphic material on wall mounted bulletin boards within the troop barracks and UOQ buildings, or near main entrances of their dining facilities should be encouraged.

Outdoor motivational signs are inappropriate for any of the housing zone and should not be used in any form.

4.12.5 Letter and Type Characteristics

All type style, letter and word spacing, color symbols, arrows and diagrams on all signs, with the exception of the motorist oriented regulatory signs, should be as per the applicable referred sign regulation. Wherever there is no specification, use TRADOC Sign Policy as guidelines.

Sign message letter-type size, message copy positioning and reading distance considerations should be as per the Installation Design, Army TM 5-803-5. Sign Placement should be coordinated and where possible integrated with other sign standards, light poles, and other site-furniture with due consideration for increasing safety and reducing visual clutter.

4.12.6 Sign Placement

Placement distance for all non-regulatory signs should be at least 25 feet from the curb of a major road and at least 15 feet from the curb of all other public roads. The only exception to this guidance should be the motorist oriented directional signs, which should be placed nearer to the road edge (but the minimum distance should be 2' with sufficient head clearance for any pedestrian activity). However, in no case should such signs reduce visibility of regulatory signs or affect traffic safety.

Wherever possible, (with the exception of motorist oriented regulatory signs) signs should be wall mounted and parallel to the building (flush or attached), as per the Post Sign Regulation.

4.12.7 Illumination of Signs

Sign lighting or illumination should be limited to the neighborhood entry area signs to orient the first time visitor during the evening hours and to establish neighborhood identity. Such sign should be illuminated in coordinated fashion with adjacent area's street lighting fixtures, type and character. The illumination level for the sign should be adequate for nighttime legibility.

Motorist oriented regulatory and directional signs should not be illuminated with special lighting, as these signs are designed for high reflectivity providing adequate nighttime legibility. Where possible, the motorist oriented directional sign's placement should be coordinated with the general street lighting design to take advantage of indirect illumination.

Identification signs should be coordinated with the residential unit's entrance area lighting design to take advantage of indirect illumination. Signs specifically identified as those requiring additional lighting should be illuminated by an external light source.

Any sign designed and approved by DEH with internal lighting (such as the Sign Standards recommended by

the Building Signage, FLW should be illuminated with low level glare-free internal lighting. Signs with mechanically or electronically moving parts and/or message (such as rotating signs, LCD or other digital signs), and signs with neon or Plexiglas box-type fully transparent or translucent light source, and/or signs with flashing or varying illumination are inappropriate for this zone and should be prohibited for any use. These restrictions do not apply to regulatory traffic signs, or air-traffic related safety lights. For additional information on sign lighting see section 3.13.

4.13 LIGHTING

4.13.1 Overview

The goal of the housing zone is to create a series of neighborhoods with a unique identity from one another and the remainder of the post. The lighting plan should reflect and reinforce this by providing orderly lighting that reinforces the separate housing areas.

4.13.2 Objectives

Lighting systems should provide adequate illumination for nighttime safety, security and path finding. The use of standard light fixtures and poles, illumination levels, and light sources can provide a consistent, orderly and purposeful visual image. Observe the following objectives within the housing zone of Fort Leonard Wood:

- Provide consistent and purposeful lighting.
- Minimize visual clutter by illuminating only those areas to be used at night.
- Reinforce the roadway hierarchy and difference in scale between roads and pedestrian areas.

4.13.3 Parking Lots

Give special consideration for the parking area entry points. Provide low-level general illumination for trees, signage or landscape features. Insure that the illumination does not interfere with visibility from the automobile.

Provide general lighting to ensure the safety of users where there is nighttime use. Light fixtures should be low level and glare free metal halide luminaries. Where possible avoid additional fixtures through combining the location of off-street parking with roadway light fixture locations.

4.13.4 On-Street Parking

Utilize roadway low level glare-free lighting and high pressure sodium luminaries. If possible allow roadway lighting to illuminate on-street parking, rather than providing additional fixtures. If necessary provide additional fixtures to ensure the safety of nighttime users.

4.13.5 Roads

Provide down-lit, non-visible or non-glare high-pressure sodium fixtures. Locate fixtures on alternating sides of the road for uniform illumination.

4.13.6 Walkways and Plazas

Provide illumination of the path only and illuminate only those paths that are used at night. Avoid light trespass into adjacent buildings and select appropriately scaled metal halide lights at courtyards and plazas.

4.13.6.1 Stairs and Ramps

Provide low level illumination only for stairs and ramps that are used at night. Use a metal halide bollard or railing integrated light source.

4.13.6.2 Service Areas

To reduce the impact of the service areas, avoid light trespass into adjacent areas. Reduce visual clutter by providing metal halide light fixtures that are building mounted where appropriate.

4.13.6.3 Buildings

Provide illumination at the entrance of those buildings that receive nighttime on-post or off-post visitors. Buildings which do not receive on-post or off-post visitors during nighttime hours require safety lighting only at their entrances.

4.13.7 Signage

Provide additional illumination only for neighborhood entrance signage.

4.13.8 Illumination Levels

The adjacent chart describes minimum, average foot-candle requirements as dictated by level of use. These requirements will be involved in the selection of a fixture, as well as the coordination of all site furnishings. Also see TLM 5-803-5, Installation Design, and Site Furnishing Policy TRADOC HQ. Letter ATEN-FE25 April 1986.

4.14 SITE FURNISHINGS

4.14.1 Overview

Site furnishings include utilitarian items such as benches, trash receptacles, bike racks, tree grates, walls and static displays. Site furnishings should fulfill an intended function and contribute positively to the visual quality, image and identification of the post. Site furnishings throughout the installation should be coordinated into a system or "family" of furnishings that relate to one another in terms of design. Site furnishings should be properly selected and placed to meet user needs and be visually appropriate and compatible with the specific application and the surrounding environment. Visual unity should be further reinforced through uniform treatment of the details of installation, paving, screening and planting associated with the site furnishings.

4.14.2 Objectives

Within the housing zone, site furnishings are generally inappropriately placed and visually dominant. Site furnishings should be properly utilized to provide needed pedestrian amenities while minimizing visual clutter. The design and layout of site furnishings should reinforce and emphasize the residential character of the zone. Within the UOQ and family housing areas, site furnishings should be used to enhance special group use areas such as picnic, playground and recreation areas. Site furnishings should be utilized to improve the visual quality and the pedestrian scale and character of the troop housing area. Design objectives for site furnishings in this zone include:

- Utilize a coordinated system of site furnishings and treatments to improve visual unity and quality.
- Provide proper screening and placement for service areas, and service and utility elements.
- Utilize site furnishing placement and detailing to enhance the pedestrian environment, particularly within the Troop Housing area.

4.14.3 Benches

4.14.3.1 Location

Benches should be located in areas of high pedestrian use, and arranged to encourage socialization within a pleasant outdoor setting. Seating should be located in areas of high use in the higher density UEPH housing, such as Specker Barracks. This includes building entryways, pedestrian nodes along major walkways and at bus stops and other waiting areas. In family housing areas, seating should be located at neighborhood nodes such as bus stops and playground areas.

Where possible, seating should be incorporated into retaining walls and planter structures. In open areas, freestanding benches should be used. Benches should be sited on concrete pads adjacent to walkways. Provide proper clearance around benches, a minimum 2'0" setback from adjacent sidewalks and a minimum of 5'0" between front of bench and any stationary obstacle. Provide appropriate planting treatment for visual definition and seasonal shade. Orientation of seating and planting should be considered to provide optimum shaded seating through the day and take advantage of pleasant views. See Planting, section 3.11.

4.14.3.2 Design

Benches should be a standard 6' long contoured style, constructed of 3" x 4" redwood members or recycled plastic. Wood benches with backs are appropriate for the informal gathering, resting, eating and waiting uses characteristic of the various housing areas.

Metal support base should have a dark brown factory finish to match standard trim color. Bench dimensions should meet specifications presented in the Installation Design Manual, TM5-803-5, 1 March 1981.

Bench design in playground and open space areas, should be dark brown vinyl coated wire mesh benches with a back. Wherever possible, seating should be incorporated into planter boxes or retaining walls, particularly at building entrance areas. Seating walls should be integrated into the overall area design and the pedestrian circulation system. Seating

walls should generally be between 18" and 24" high and 12" to 18" wide, constructed of concrete or brick in a manner that is visually compatible with the character and materials of adjacent buildings.

4.14.4 Tables

4.14.4.1 Location

Picnic tables should be provided at neighborhood park and playground areas within the family housing areas. Paved picnic patios with one to two tables should be provided between buildings UOQ, UEPH and troop housing areas. Utilize pavilions to cover tables and incorporate plantings for shade and spatial definition.

4.14.4.2 Design

Tables within the family housing and UEPH areas should be standard, one piece picnic tables of six feet in length. Tables should be redwood, stained dark brown, or dark brown powder coated wire mesh with a 2" tubular metal framework. The base should have a dark brown factory finish.

4.14.5 Mail Boxes

Group mailboxes within multi-family housing areas in a central locations that is highly visible. Place mailboxes on paved areas adjacent to walkways. Mailbox shelters should be of a consistent design that relates to the architectural character of the setting in terms of form, materials and details. Mailbox units should be anodized dark brown factory finish.

4.14.6 Telephone Booths

4.14.6.1 Location

Locate telephone booths in high visibility locations adjacent to major walkways or near the intersection of major walkways within the troop housing areas. Booths should be placed in attached groups of four or five units. Groupings should be installed on a concrete slab. Provide a minimum 3'-0" clearance between booths and the edge of walkways. All service line wiring should be underground or concealed. Booths should be equipped with lighting

for nighttime use. Telephone booths should be integrated with other street furnishing, such as seating areas or bus or vending shelters, whenever possible and appropriate. Utilize landscape planting to provide visual transition, buffering and shade for booths.

4.14.6.2 Design

Utilize modular telephone booth system as available through the telephone company. Colors of booth should be subdued and blend in with the surroundings. A lighted telephone symbol can be used to accent the booths.

4.14.7 Bus Shelters

4.14.7.1 Location

Bus shelters should be located at major stopping points along the perimeter of the various housing areas and adjacent to walkways. Shelters should be placed on concrete pavement. Provide a minimum 3'-0" clearance between booths and edge of walkways. Locate bus shelters in association with other street furnishings, such as seating areas, vending shelters or telephone booths, where possible, particularly at major walkway nodes. Plantings should be provided for shade and to buffer bus shelters.

4.14.7.2 Design

Bus shelters should provide protection from wind, rain and sun. Shelters should have an overhead roof with enclosure on three sides. Side enclosures should be a transparent, unbreakable type material for visibility. Design should be simple and consistent throughout the post, with a minimum size of 5' by 8' and a minimum height of 6'-6" from floor to underside of roof. Bus shelters should include an integral bench, trash receptacle and ashtray.

4.14.8 Vending Machines

Outdoor vending machines should not be allowed within the housing zone. Vending machines used in the UEPH and troop housing areas should be located within the buildings.

4.14.9 Kiosks

4.14.9.1 Location

Kiosks can be used as information centers at high traffic areas within the troop housing areas. Locate kiosks for high visibility and exposure to pedestrian traffic. Provide kiosks only where they are needed on concrete pavement adjacent to walkways. Allow a minimum of 3'-0" clearance on all sides.

4.14.9.2 Design

Kiosk design should blend compatibly with other site furnishings and with the architectural character of the zone in terms of form, scale and materials. A standard design treatment should be established for kiosks throughout the installation.

4.14.10 Walls and Fencing

4.14.10.1 Location and Use

Walls and fencing should be used in this zone to provide area definition, visual screening, pedestrian traffic control and to retain soil. Walls and fencing should be of appropriate design and materials to fulfill their function in harmony with the character and appearance of their setting.

4.14.10.2 Walls

Low walls should be used to define building entry court areas and provide informal seating at UEPH and troop housing areas. Walls adjacent to walkways should be free of any projections, such as signs or drain pipes that would pose a hazard to pedestrians. Walls in this zone should be constructed of either brick or concrete as follows: brick to be of color and coursing to match adjacent buildings and have a stone or concrete cap concrete with a rusticated finish.

4.14.10.3 Fences

Fences should be used to screen service areas and site utilities, and provide definition and separation between playground/recreation areas and adjacent roadways. Screen fencing in the housing zone should consist of square tubular metal posts and rails with vertical wood fence boards. All metal posts and

framework should be painted dark brown and wood fencing should be CCA pressure treated.

Separation fencing should be vinyl clad no climb chain link. Color of the vinyl finish should be forest green. All fence posts should be adequately anchored with concrete footings.

4.14.11 Trash Receptacles

4.14.11.1 Location

Trash containers should be highly visible and accessible for effective litter control. Containers should be located conveniently along walkways, near major walk intersections, at building entrances, and near seating areas. Trash containers should be located adjacent to walkways either as part of a site furnishing group or individually on a 30" square pre-cast concrete slab.

4.14.11.2 Design

Container should be of a design that is compatible and in harmony with other site furnishings, particularly benches. A square concrete container with a removable dark brown liner and exposed aggregate finish should be used within the housing zone. Container should be sufficiently strong and stable to resist overturning.

4.14.12 Dumpsters

4.14.12.1 Location

Dumpster containers should be located conveniently to the facility they serve. Siting of dumpsters should be addressed as part of building design. Dumpster placement should be incorporated into building service area and be screened with walls that are coordinated with the building design.

Dumpsters sited outside of building service areas should be located to create minimal visual impact on surrounding uses while allowing access for dumping and collection. Avoid dumpsters along major circulation or use areas; rather, locate them at edges of specific use areas and align with wall and building edges. Dumpsters should be directly accessible by way of a paved service drive or parking lot. Provide adequate overhead clearance for collection vehicles.

Provide planting to buffer visual impact of screen walls or fences. Small residential dumpsters utilized in the Family Housing areas should be stored either at the service/carport area or at the rear of the building.

4.14.12.2 Design

Use walls or fencing in combination with plantings to provide screening of service and utility areas. Brick screen walls with a pre-cast concrete capstone, such as those found at the NCO Academy, are the preferred standard for the post. When this is not economically feasible, wood fences shall be used to screen dumpsters, such as those installed in the Sturgis Housing Area. Where space allows incorporate berms and plantings with brick and wood screen walls to lessen the visual impact of dumpster sites. Provide a minimum of 3'-0" clearance on each side between screen structure and dumpster to provide pedestrian and truck access. All dumpsters should be painted dark brown and placed on concrete pads.

4.14.13 Planters

When planted with annual flowers, movable planters may be used outside the entrance dormitory type housing to provide seasonal color and interest and for security purposes. Planters should be located so they block uninterrupted vehicular access to a building, but not so they excessively impede pedestrian circulation. Several planters of various sizes should be grouped together to produce an aesthetically pleasing display.

4.14.14 Bike Racks

Bike racks should be provided near UOQ, UEPH and troop housing entrances and near playgrounds and community facility destinations such as the swimming pool. They should be located on a concrete surface where they will not impede pedestrian movement or block building entrances. A ribbon type tubular metal bike rack with a powder coat or integral dark bronze finish is recommended as the post standard. See Bikeways, section 3.9.

4.14.15 Tree Grates

Tree grates should be used when installing trees in large paved areas such as pedestrian plazas and entrance courts in UOQ, UEPH and troop housing areas. Tree grates and planting pits should be a minimum of 5' x 5'.

4.15 UTILITIES

4.15.1 Overview

Utility systems provide the basic infrastructure of power, communication, water and sewer services necessary for the operation of buildings and other facilities. They have played a significant role in the visual character of the housing zone. While most of the high visibility areas of the zone are free of major problems, some existing utility location and their treatments detract from an overall positive image.

The visual problems include:

- Placement of utility functions, with inadequate visual screening or inappropriate treatment, especially near main entry points to the family housing areas. In particular: Building 1601: Water Treatment Facility and Building 2369: Heating Plant.
- Overhead electrical distribution lines along major access roads to the housing areas, e.g. Oklahoma and Constitution Avenues.

4.15.2 Objectives

The existing positive image of the family housing areas of the zone, and the desired "quality of life" should be enhanced by selective visual improvements to the existing utilities.

- Utility systems should be designed and coordinated with the topography, landscaping, site furnishing, pedestrian pathways, bikeways, lighting and other site improvements to minimize their visual impact.
- Utility systems should be designed to minimize adverse environmental impacts. In particular, storm drainage design should minimize soil erosion and resultant visual impact.
- Maintenance and repair of utility systems, as well as their visual screening elements, should be an important consideration in the design of the system.
- All utility elements should be designed to project an image of army values and excellence, in support of the mission of the post.

4.15.3 Design Considerations

4.15.3.1 Electric Service

The guidelines for electric service include criteria for the location of all new facilities and for the reduction of visual impacts from the existing utilities. In higher density housing, such as UOQ (4100 area) or Specker Barracks, power distribution lines should be located underground. If currently overhead, they should be relocated out of view from high visibility areas, such as: Nebraska Avenue, Constitution and Officers Open Mess (building 4109); or screened to be as unobtrusive as possible. All feeder lines within the housing zone, especially pedestrian areas such as Specker Barracks and UOQ courtyards, should be located underground.

Overhead lines within the family housing areas should avoid alignments along or across major public circulation routes (such as Constitution and Oklahoma Avenue) and instead use minor streets or natural open spaces (e.g. existing power lines in 4600 - 4700 areas). Incorporate landscaping to minimize the visual impact of overhead lines. Natural storm water drainage and wooded buffer areas behind residential units allow power distribution and feeder lines to be located along the rear of most housing units.

The visual length of overhead distribution lines (for example Constitution and Oklahoma Avenue) can be reduced by interrupting views with trees or offsetting the location behind trees, where long views of the line along a road would otherwise occur. Poles and line attachments should have a simple consistent design compatible with the overall streetscape design. Also see: Exterior Utilities Policy, TRADOC HQ letter ATF.N-FE, 19 December, 1985; and Site Furnishings Policy, TRADOC HQ letter ATEN-FE, 25 April 1986.

4.15.3.2 Transformers

Transformers should not be suspended from poles where their silhouette against the open skyline makes them more visible. Instead, transformers should be located near the ground plain and screened from view from roads and other high visibility areas. Transformers should not be located

near pedestrian paths and courtyards (e.g. Specker Barracks areas). Wherever possible, transformers should be placed or moved within service areas (e.g. loading area of the dining facilities) or close to other support services (e.g. heating plant-cooling towers) or close to a non-pedestrian side of a building to visually screen it with compatible architectural wall and landscaping elements in a non-obtrusive manner. Also see: Standards for Dumpsters and Ground Mounted Utilities, TRADOC H.Q. letter ATEN-FF. 30 September, 1985.

4.15.3.3 Substations

Substations should not be located within high visibility areas of the housing zone or near major roads leading to the zone. Substations are best located in the industrial and open space zones, away from high visibility uses and circulation paths. Screen substations from public views by means of visually compatible architectural enclosure walls, earth berms, and landscaping.

4.15.3.4 Sewer, Water and Steam Heat Lines

All sewer, water, and steam heat lines should be underground. Sewer and water treatment facilities should be located outside housing areas and screened from views of major roads and other installation facilities by the use of earth berms, plant material, *opaque fencing and/or architectural enclosure walls*. High elements, such as smoke stacks and overhead water storage and supply tanks, should be located away from major roads and individual residential buildings. These elements should preferably be located in industrial and peripheral open space zones.

Steam heat pipe vents and other utility ventilation openings and stand pipes should be located away from pedestrian and other high visibility areas, and existing vents should be screened from view, by visually compatible architectural walls or landscaping.

The existing condition of the water treatment plant (Building 1601) at the major residential neighborhood entry point should be corrected by providing adequate landscaped buffer space. If necessary, the intersection of Oklahoma - South Dakota Avenues and Constitution should be realigned to provide a

connection to Thayer Elementary School and increase the existing buffer. (Also see MTMC Report TC 84-6a-55, Traffic Engineering Study, FLW, July 1995).

Fire hydrants and post indicators on fire sprinkler service should be highly visible and free from any screening. They should be uniform in design and color throughout the installation for fire hydrants. Brown: 10080, as per TM 5-807-7, is suggested. The placement of fire hydrants should be coordinated with other streetscape elements to create visual order.

4.15.3.5 Storm Drainage

The guidelines for the drainage system include criteria for all new facilities to enhance the visual quality of the existing system. Paved surfaces, especially for parking and pedestrian areas within Specker Barracks and UOQ areas, should cover the minimum area required. Pervious areas within a drainage shed should be maximized to lessen storm-water runoff. Consideration should be given to the use of pervious paving or paving blocks that permit the grass to grow through them, thereby reducing storm-water runoff. An Underground system should be used to drain roads, parking and pedestrian areas in higher density residential zones, including common parking courts of the family housing areas. This includes the use of curbs, inlets, catch basins, and underground storm sewers.

Swales and ditches along natural drainage channels should be used in low-density areas, especially family housing areas. However, they should be properly designed along natural contours with adequate slopes to prevent standing water. Steep swales and ditches should be designed with maximum side slopes of 3:1 to accommodate mowing equipment. Slopes should be planted with turf, low shrubs or ground cover.

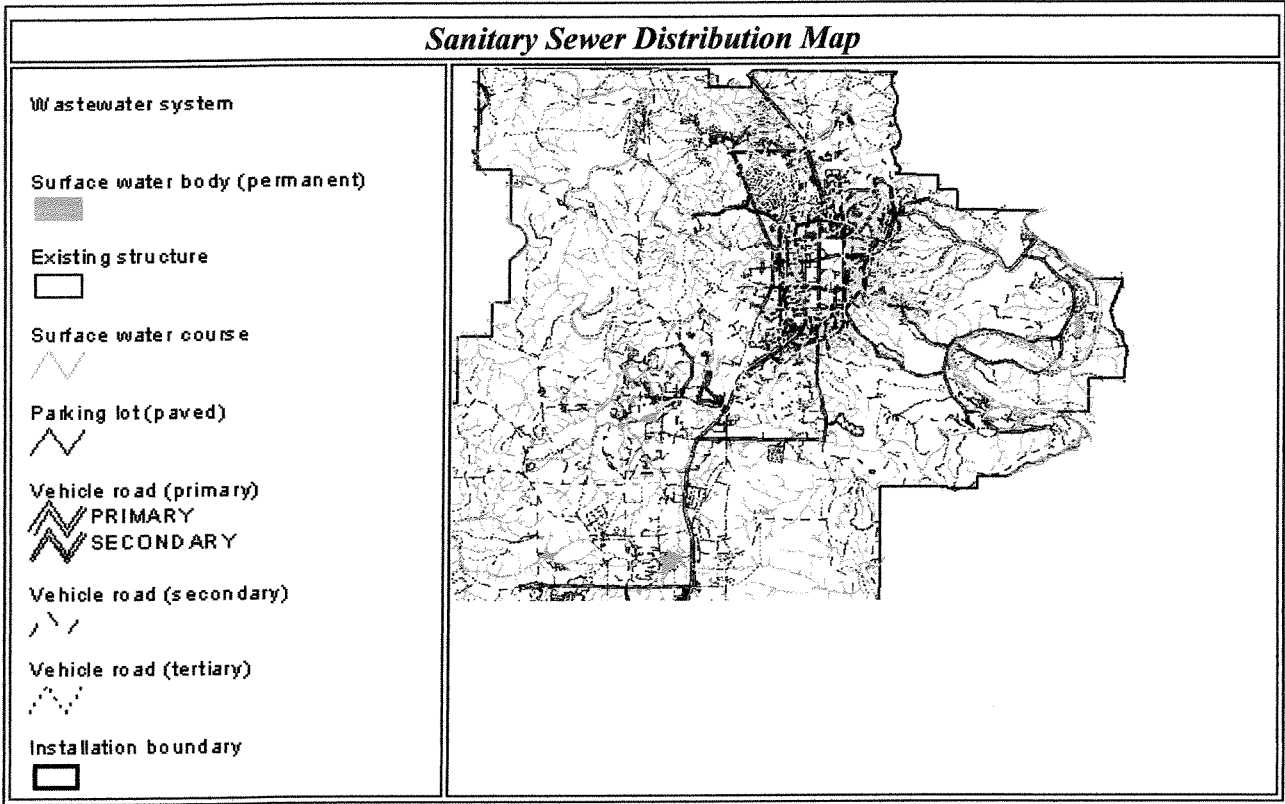
Artificial drainage courses, particularly outlet waterways, must be constructed of materials suitable to the quantity and velocity of the storm water runoff. Outlet waterways with slopes or flows greater than that which can be safely vegetated should be treated with riprap or gabion mattresses. Concrete channelization should be avoided within any portion of the housing zone area. Headwalls and flared end

sections should be used where ditches intersect roads or other crossings. Proper erosion and sediment control practices should be followed for disturbed areas during construction of any facility within the zone. These include seeding, sediment control basins and structures.

Potential opportunities to create permanent ponds as special landscape features or temporary storm water retention ponds should be considered when designing the storm water control system, especially for troop and UOQ areas.

4.15.3.6 Telephone Service

The existing policy of underground cable on the backside of residential buildings should be continued to eliminate visual clutter of feeder lines at the street side.



electrical

